of a given kite have been fully brought out as a result of exact and systematic measurements upon the behavior of the kite, it is my purpose to critically analyze the strains upon every member of the kite frame, and proportion the strength of each member to the strain it must bear. The whole structure of the kite is a system of connected trusses, the strains upon the several parts of which may be easily determined by the methods so commonly employed in the construction of bridges and similar framed structures. This method of analysis can not fail to result in an increase of strength and decrease of weight, as all material will be employed to the best advantage.

The longitudinal truss, made to the dimentions indicated on the drawings, has, in some cases, proved too weak. At the present stage of the investigations considerable attention has been given to finding the best proportions for the distances between the cells and between the surfaces of a single cell, also, the proper width of the cloth bands. Much valuable observational data has been obtained, but further information is needed before a definite conclusion can be stated. When the best length for the longitudinal truss of a given kite is definitely known, I think it will be an easy matter to greatly improve the construction of the truss so as to secure adequate strength with the minimum weight. Thus far the sticks of the rectangular frames have been made of the same size throughout, notwithstanding that it is plain not only that some frames on a given kite are under greater strain than others, but that different parts of the same frame receive very different strains.

General remarks on constructions.—It may be added here that the improved construction while in fact very simple to a person with a few tools and gifted with real mechanical dexterity, does not claim to be of such a degree of simplicity that anybody can practice it. The novice with hammer and vise may be puzzled, for example, to neatly form the tin angle pieces shown in Fig. 53. Stringing the wire ties in the frame, just as they should be, may also prove perplexing. These operations take some time and require some skill, but when a cell is completed you have something that can stand the wind. The cloth is not going to work loose and give trouble after the kite has been flying an hour or two in a stiff breeze, neither will the symmetry of the cell be impaired. The original construction of such a kite requires a little more time than other forms, but it retains its efficiency and symmetry a longer time in the end, and, because of this latter quality is less likely to distort and smash itself in a precipitate dash to the earth.

Aside from all these comments on the simplicity of construction, the object of paramount importance ever in the mind of the writer has been to secure the maximum attainable efficiency in the action of a given kite. Other things have been subordinate to this. The old-fashioned slide-valve steam engine, with fixed cut-off for example, is a marvel of simplicity compared with the complex, intricate, quadruple expansion engines of modern type, with balanced valves and automatic cut-off gear. What is the excuse for this complication?—efficiency. The improved engine will do twice the work, it may be, per pound of coal and barrel of water consumed. Just so with kites. One or two efficient kites, a moderate length of wire under an easy and safe-working tension, are all that are required to reach great elevations in fair winds. With kites of less efficiency to reach the same elevation, more kites, more wire, and far greater strains are necessary, increasing greatly both the danger of breaking the wire and the labor of winding it in. The incentive to fly kites to great elevations and thus excell all previous records is naturally very great. To do so on the principle that any kite is good enough so long as the result is attained, may be justifiable in the minds of some, but is hardly scientific. The writer believes that when kites of the maximum attainable efficiency are produced, and of which the strength and weight of the several members are duly and intelligently proportioned to the strains they must bear, just as is done in great bridges, only with far greater nicety, because with kites the factor of safety must everywhere be much smaller than with bridges—when these things are done, flights to astonishing elevations will follow easily of themselves and fewer reports will be read of kites breaking away with great loss of labor, wire, etc.

[To be continued in June REVIEW.]

NOTES BY THE EDITOR.

LONG-RANGE FORECASTS.

On the morning weather map of June 13, as published by the Weather Bureau at Portland, Oreg., Mr. B. S. Pague, the local forecast official, calls attention to the fact that this map shows the first appearance in 1896 of the so-called type of summer weather conditions. Mr. Pague says:

In 1895 this summer type appeared on April 20, and the first winter type following that appeared on November 12. Winter weather, namely, rain conditions, have continued from November 12, 1895, to June 12, 1896. There are two well-defined types of weather on the Pacific Coast, and these have some fourteen modifications. The primary types are, first, the low area moving southward from Alaska along the coast line to the fiftieth degree of north latitude, sometimes lower, then passing eastward; at the same time the high pressure is off the California coast, and it finally moves eastward about the fortieth degree of north latitude. These conditions are peculiar to the winter season and give rain. The second type is represented by the low areas passing eastward about the latitude of Sitka, Alaska, and then moving southeastward on the eastern slope of the Rocky Mountains toward the Great Lakes, the high pressures moving from and along the California coast northward along the coast line to the fiftieth degree of north latitude, thence eastward. These conditions give fair and warmer weather.

The latter type is present for the first time this morning, for this year, and experience has shown that after the first appearance of the summer condition the weather is more likely to be fair than rainy. It is not to be understood that absolute dryness is now anticipated, but rather that sunshine will predominate and the showers will be few.

The high pressure will move eastward over British Columbia and give fair weather and warmer on Sunday; Monday will be fair, and Tuesday promises to be fair and cooler, possibly some sprinkles of rain over western Washington and northwestern Oregon; Wednesday and Thursday should then be fair and warmer. Summer weather types produce weather such as is above outlined.

FROSTS IN CALIFORNIA.

Under date of May 5 Prof. E. W. Hilgard, President of the University of California and Director of the Agricultural Experiment Station at Berkeley, Cal., writes as follows:

The weather conditions in this State have been this year so extraordinary that meteorological observations and forecasts are more than ever called for, and are popularly demanded. Our experience with two of our stations this year has been a sore one, and will most seriously retard the settlement and modify agricultural practice in the districts concerned. At one station we find it necessary to completely remodel the varieties in our experimental orchard, about 50 per cent having proved useless for any practical purpose on account of their sensitiveness to even light frost, and the low temperatures of the summer nights; this at an elevation of only 1,400 feet, and in a locality where wholly unexpected. We are now actually carrying Russian apples and other hardy fruits as far south as the latitude of San Luis Obispo, as the only reasonable hope of the fruit industry in that region. In the great valley of California, too, the havoc wrought by the frost has been exceedingly heavy, and localized in the most puzzling manner. Our San Joaquin Valley station, near Tulare, has suffered almost a total loss of its fruit crop, and even barley has been frosted so badly that it will make no grain, but had to be cut for hay. It is thus evident that the observations of extremes, as well as of means, should be most carefully made and faithfully kept; to insure this our stations should be equipped with self-recording instruments.

TOTAL SNOWFALL FOR THE WINTER 1895-96.

In the REVIEW and SUMMARY for 1895, Vol. XXIII, pp. 491 and 500, the Editor has given the annual snowfall for the so-called snow year, July to June, inclusive, for the ten years 1884-95. The following table gives the corresponding data for 1895-96. In a few cases, where records have been interrupted by discontinuance of stations, the values given by voluntary reporters have been used to complete an annual total. These snowfalls are also reproduced in Chart VII, but lines of equal snowfall are not drawn as the great distance of the stations apart and their diverse locations forbid reliance upon any system of interpolated lines.

Total snowfall at Weather Bureau stations.

(The snowfall is given for the so-called snow year, viz, from July 1, 1895, to June 30, 1896, inclusive.)

Station.	Inches.
Alabama.	
Mobile	T.
Montgomery	T.
Arizona.	
Tucson	0.0
Yuma	0.0
Arkansas.	
Fort Smith	5.0
Little Rock	3.1
California.	
Independence	0.0
Red Bluff	1.0
Sacramento	0.0
San Francisco	0.5
Colorado.	
Colorado Springs	41.2
Denver	58.3
Montrose	36.3?
Pueblo	18.8
Connecticut.	
New Haven	35.1
New London	37.6
District of Columbia.	
Washington	9.3
Florida.	
Jacksonville	0.0
Pensacola	0.0
Tampa	0.0
Georgia.	
Atlanta	0.2
Augusta	T.
Savannah	T.
Idaho.	
Idaho Falls	53.7
Illinois.	
Cairo	13.9
Chicago	56.6
Springfield	16.3
Indiana.	
Indianapolis	46.8
Iowa.	
Davenport	22.8
Des Moines	26.5
Dubuque	33.7
Keokuk	21.2
Sioux City	15.1
Kansas.	
Concordia	15.7
Dodge City	5.3
Topeka	11.4
Wichita	10.7
Kentucky.	
Lexington	28.1
Louisville	32.0
Louisiana.	
New Orleans	0,0
Shreveport	T.
Maine.	
Eastport	57.5
Portland	77.1
Maryland.	
Baltimore	17.0
Massachusetts.	
Boston	38.2
Nantucket	32.0
Vineyard Haven	27.8
Woods Hole	33.9
Michigan.	
Alpena	53.7
Cheboygan	99.8
Detroit	54.3
Grand Haven	58.8
Marquette	105.8
Port Huron	29.2
Sault Ste. Marie	110.7
Minnesota.	
Duluth	40.4
Minneapolis	27.0
Moorhead	43.0
St. Paul	41.5
St. Vincent	52.0?
Mississippi.	
Meridian	T.
Vicksburg	0.0
Missouri.	
Columbia	27.7
Hannibal	21.4
Kansas City	29.3
St. Louis	17.2
Springfield	25.7
Montana.	
Havre	38.5
Helena	58.2
Miles City	23.3
Nebraska.	
North Platte	20.8
Omaha	20.8
Valentine	36.9
Nevada.	
Carson City	27.3
Winnemucca	41.1
New Jersey.	
New Brunswick	5.8
New Mexico.	
Santa Fe	45.4
New York.	
Albany	51.6
Buffalo	72.0
New York	42.0
Oswego	74.9
Rochester	93.8
North Carolina.	
Charlotte	1.1
Hatteras	T.
Kittyhawk	5.0
Raleigh	1.2
Wilmington	12.1
North Dakota.	
Bismarck	37.0
Williston	94.7
Ohio.	
Cincinnati	29.3
Cleveland	48.2
Columbus	27.4
Saudusky	25.2
Toledo	63.7
Oklahoma.	
Oklahoma	5.7
Oregon.	
Astoria	6.0
Baker City	33.2
Portland	9.1
Roseburg	16.7
Pennsylvania.	
Erie	71.8
Harrisburg	32.7
Philadelphia	14.8
Pittsburg	23.3
Rhode Island.	
Block Island	36.4
Narragansett Pier	29.5
South Carolina.	
Charleston	T.
Columbia	0.6
South Dakota.	
Huron	20.1
Pierre	27.3
Rapid City	40.3
Tennessee.	
Chattanooga	1.9

Total snowfall—Continued.

Station.	Inches.
Tennessee—Continued.	
Knoxville	3.5
Memphis	8.6
Nashville	5.0
Texas.	
Abilene	4.0
Amarillo	12.8
Corpus Christi	0.0
El Paso	0.4
Galveston	0.0
Palestine	T.
San Antonio	0.0
Utah.	
Salt Lake City	40.2
Vermont.	
Northfield	89.8
Virginia.	
Cape Henry	3.6
Lynchburg	11.5
Norfolk	5.7
Washington	
East Clallam	37.0
Fort Canby	5.3
Neah Bay	20.0
Olympia	3.0
Port Angeles	18.0
Port Crescent	24.8
Pysht	25.0
Seattle	10.4
Spokane	46.6
Tatoosh Island	7.9
Walla Walla	17.0
West Virginia.	
Parkersburg	32.9
Wisconsin.	
Green Bay	32.5
La Crosse	36.4
Milwaukee	51.4
Wyoming.	
Cheyenne	50.3
Lander	64.6

RÖNTGEN RAYS AND CLOUDY CONDENSATION.

Although meteorologists have not yet ascertained the exact process by which rain drops are made by Nature in her atmospheric laboratory, yet much light has been thrown upon the formation of the little globules of water that make up the ordinary mist and cloud. Among those who have worked upon the subject of the cloudy condensation of atmospheric moisture the most prominent names are: Coulier, of France, John Aitken, of Scotland, Robert, the son of Hermann von Helmholtz, and also Kiessling, both of Germany, and Carl Barus, formerly of the Weather Bureau, Washington. These physicists have shown that when moist air is cooled nearly to the dew-point the aqueous vapor begins to condense by preference upon the minute solid particles which we call dust floating in the atmosphere, no matter what the chemical nature of these particles may be; over the ocean the nuclei are mostly minute crystals of salt; in tropical lands and hot countries they are the spores and cells of debris of cells of vegetable origin; in the smoky atmosphere of large cities, the minute particles of carbon that go to form soot constitute the nuclei. It has not yet been clearly ascertained how the moist air would give up its moisture if there were absolutely no nuclei on which to initiate the condensation. Some consideration of this subject has been indulged in by Von Bezold and slightly modified by the present writer (see "The Production of Rain," in Frear's Monthly Journal Agricultural Science, 1892, Vol. VI, pp. 297-309) to the effect that in the ascending portions of every cloud there are regions that are supersaturated with moisture and that a strained molecular condition is thus produced that eventually and suddenly gives way accompanied by the production of the large drops of rain and electric phenomena. These views on the formation of cloud in the absence of dust were (probably quite independently) investigated by Mr. C. T. R. Wilson, according to an abstract published in Nature, Vol. LII, p. 144, of the paper read by him on May 13, 1895, before the Philosophical Society of Cambridge, England. Wilson found (as, indeed, Espy had done before him, see Espy's Philosophy of Storms, p. 35-36) that—

If ordinary air is started with, it is found that after a comparatively small number of expansions (due to the removal of the dust particles by the condensation that takes place on them) there is no further condensation unless the expansion exceeds a certain definite amount. With expansion greater than this critical value condensation again invariably takes place, and the critical value shows no tendency to rise, no matter however many expansions be made. The latest result for the ratio of the final to the initial volume, when the critical expansion is just reached is 1.258 (when initial temperature is 16.7° C. = 62.06° F.). This corresponds to a fall of temperature of 26° C. (46.8° F.) and a vapor pressure 4.5 times the saturation pressure for a plane surface of water. The radius of a water drop just in equilibrium with this degree of supersaturation is 0.0000065 cm. = 0.00000256 inch,